

Accuracy Characteristics for ZJX Risk Reduction Revision B Scenario Hours 1520-1730

1 Introduction

This document contains an abridged version on the scenario characteristics for hours 1520 to 1730 (actual recorded data from 15:23.30 to 17:29.25) GMT recorded on October 8, 2002 at Jacksonville ARTCC (ZJX). Characteristics provided are general statistics determined from the scenario on general air traffic activity and aircraft and air carrier characteristics. Definitions for these scenario characteristics are provided in [1]. Definitions for the conflict and encounters in Tables 1 and 2 are further explained in [2] and [3].

2 Conflict and Encounter Properties

Table 1: Conflict Parameter Distributions

			Non Time-Shifted	Time Shifted ¹	
		Required Sample Size (1.75x)	Reference (x)	Conflict Analysis 1	Conflict Analysis 2
Number of Conflicts		126	45	128	117
Horizontal Separation	0 to 1 nm	42 33.33%	15 33.33%	42 32.81%	38 32.48%
	1 to 2 nm	25 19.84%	9 20.00%	25 19.53%	24 20.51%
	2 to 3 nm	25 19.84%	9 20.00%	25 19.53%	22 18.80%
	3 to 4 nm	34 26.98%	12 26.67%	34 26.56%	31 26.50%
	4 to 5 nm	0 0.00%	0 0.00%	2 1.56%	2 1.71%
Vertical Separation	0 to 400 ft	106 84.13%	38 84.44%	107 83.59%	100 85.47%
	400 to 800 ft	8 6.35%	3 6.67%	8 6.25%	5 4.27%
	800 to 1200 ft	6 4.76%	2 4.44%	7 5.47%	6 5.13%
	1200 to 1600 ft	3 2.38%	1 2.22%	3 2.34%	3 2.56%
	1600 to 2000 ft	3 2.38%	1 2.22%	3 2.34%	3 2.56%
Encounter Angle	0° to 30°	75 59.52%	27 60.00%	82 64.06%	78 66.67%
	30° to 60°	14 11.11%	5 11.11%	14 10.94%	12 10.26%
	60° to 90°	3 2.38%	1 2.22%	3 2.34%	2 1.71%
	90° to 120°	3 2.38%	1 2.22%	3 2.34%	3 2.56%
	120° to 150°	0 0.00%	0 0.00%	1 0.78%	1 0.85%
	150° to 180°	31 24.60%	11 24.44%	25 19.53%	21 17.95%
Phase of Flight	Level-Level	45 35.71%	16 35.56%	31 24.22%	27 23.08%
	Level-Trans	50 39.68%	18 40.00%	56 43.75%	51 43.59%
	Trans-Trans	31 24.60%	11 24.44%	41 32.03%	39 33.33%

¹ Conflict Analysis 1 includes analysis on the Conflict Scenario evaluated based on aircraft tracks starting at the inbound handoff and ending at center crossing boundary (same as Reference Scenario). Conflict Analysis 2 includes the same Conflict Scenario evaluated based on aircraft tracks starting at the first HCS recorded track report and ending at outbound handoff (this is same rules used in URET CCLD Formal Accuracy Test).

Table 2: Encounter Parameter Distributions

		Non Time-Shifted	Time Shifted ²	
		Reference	Encounter Analysis 1	Encounter Analysis 2
	Number of Encounters	1596	1932	1684
Horizontal Separation	0 to 5 nm	320 20.05%	381 19.72%	332 19.71%
	5 to 10 nm	242 15.16%	283 14.65%	239 14.19%
	10 to 15 nm	338 21.18%	374 19.36%	313 18.59%
	15 to 20 nm	328 20.55%	460 23.81%	400 23.75%
	20 to 25 nm	368 23.06%	434 22.46%	400 23.75%
Vertical Separation	0 to 1000 ft	623 39.04%	758 39.23%	640 38.00%
	1000 to 2000 ft	116 7.27%	155 8.02%	139 8.25%
	2000 to 3000 ft	641 40.16%	800 41.41%	685 40.68%
	3000 to 4000 ft	75 4.70%	86 4.45%	88 5.23%
	4000 to 5000 ft	141 8.83%	133 6.88%	132 7.84%
Encounter Angle	0° to 30°	330 20.68%	429 22.20%	424 25.18%
	30° to 60°	107 6.70%	150 7.76%	131 7.78%
	60° to 90°	61 3.82%	50 2.59%	49 2.91%
	90° to 120°	66 4.14%	62 3.21%	56 3.33%
	120° to 150°	162 10.15%	163 8.44%	127 7.54%
	150° to 180°	870 54.51%	1078 55.80%	897 53.27%
Phase of Flight	Level-Level	735 46.05%	777 40.22%	668 39.67%
	Level-Trans	573 35.90%	675 34.94%	635 37.71%
	Trans-Trans	288 18.05%	480 24.84%	381 22.62%

² Same as footnote 1 for encounter analysis. Note: time shifting methodology targeted generation of approximately twice the Reference Scenario's conflict distribution, but the distribution of encounters are achieved only as a consequence.

3 Air Traffic Distributions

This section provides metrics that characterize the air traffic. The metrics are flight density partitioned by standard flight levels, flight type and sector penetration, statistics on the number of active flights, ground speed statistics, counts of interim altitude and amendment messages, and air traffic maneuvers by altitude and phase of flight. This section corresponds to Section 3.3 of Reference[1].

3.1 Active Flights

This section corresponds to section 3.3.2 of Reference[1].

Table 1: Statistics on Active Flights per Minute Increment

Count Average	Standard Deviation	Maximum Count	Minimum Count
148.485	70.072	217	0

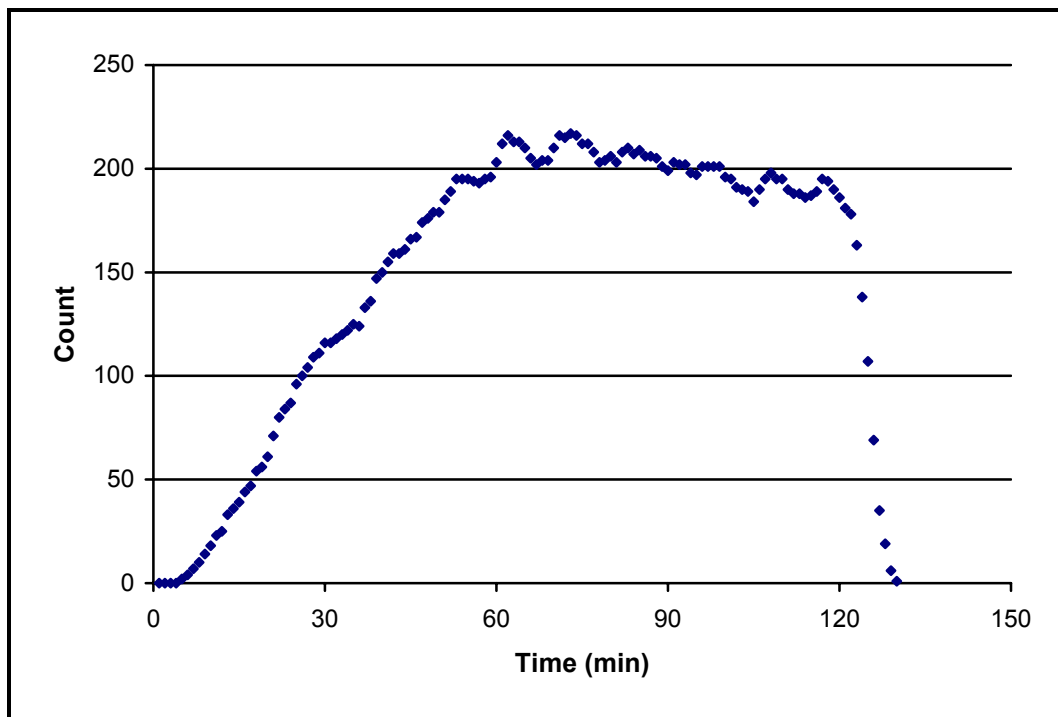


Figure 1: Count of Active Flights per Minute Increment

3.2 Flight Type and Sector Penetration

This section corresponds to Section 3.3.3 of Reference[1].

Table 2: Statistics on Sector Time, Center Time and Sector Penetration by Flight Type

Metric	Arrivals	Departures	Internals	Overflights	All Flights
Average Number of Sectors Penetrated	1	1	1	1	1
Average Time in Center (sec)	1971.032	1726.020	1626.053	2068.182	1893.746
Average Time in Sector (sec)	1971.032	1726.020	1626.053	2068.182	1893.746
Percentage by Flight Type	22.261	34.629	6.714	34.982	100.000

3.3 Interim Altitude Messages

This section corresponds to Section 3.3.6 of Reference[1].

Table 3: Statistics on Interim Altitude Messages ³

Flight Count	Average	Standard Deviation	Maximum Count	Minimum Count
330	2.618	0.902	6	1

3.4 Amendment Messages

This section corresponds to Section 3.3.7 of Reference[1]

Table 4: Statistics on Amendment Messages per Flight⁴

Flight Count	Average	Standard Deviation	Maximum Count	Minimum Count
314	2.341	1.387	8	1

³ Statistics on flights with interim altitude messages only

⁴ Statistics on flights with flight plan amendments only

3.5 Air Traffic Maneuvers

This section corresponds to Section 3.3.8 of Reference[1]. Detailed statistics on air traffic maneuvers are provided in Appendix C.

Table 5: Total Track Report Maneuver Count by Vertical and Horizontal Phase of Flight

Vertical Phase	Horizontal Phase of Flight		Total
	STR	TURN	
ASC	4450	953	5403
DES	3120	616	3736
LEV	1029	607	1636
Total	8599	2176	10775

Table 6: Percent breakdown of Flight Tracks by Vertical and Horizontal Phase

Vertical Phase	Horizontal Phase of Flight		Margin (%)
	STR (%)	TURN (%)	
ASC	41.299	8.845	50.144
DES	28.956	5.717	34.673
LEV	9.550	5.633	15.183
Margin (%)	79.805	20.195	100.000

4 Aircraft Distributions

This sections provides the metrics used to characterize the aircraft provided in the scenario. The selected metrics are aircraft type, model, navigational equipment, and the air carriers operating in the airspace. The section corresponds to Section 3.4 of Reference[1].

4.1 Aircraft Type

This section corresponds to Section 3.4.1 of Reference[1].

Table 7: Count by Aircraft Type

Aircraft Type	Count	Percentage of Total
J	418	73.852
P	53	9.364
T	59	10.424
Unknown	36	6.360
Total	566	100.000

4.2 Aircraft Models

This section corresponds to Section 3.4.2 of Reference[1].

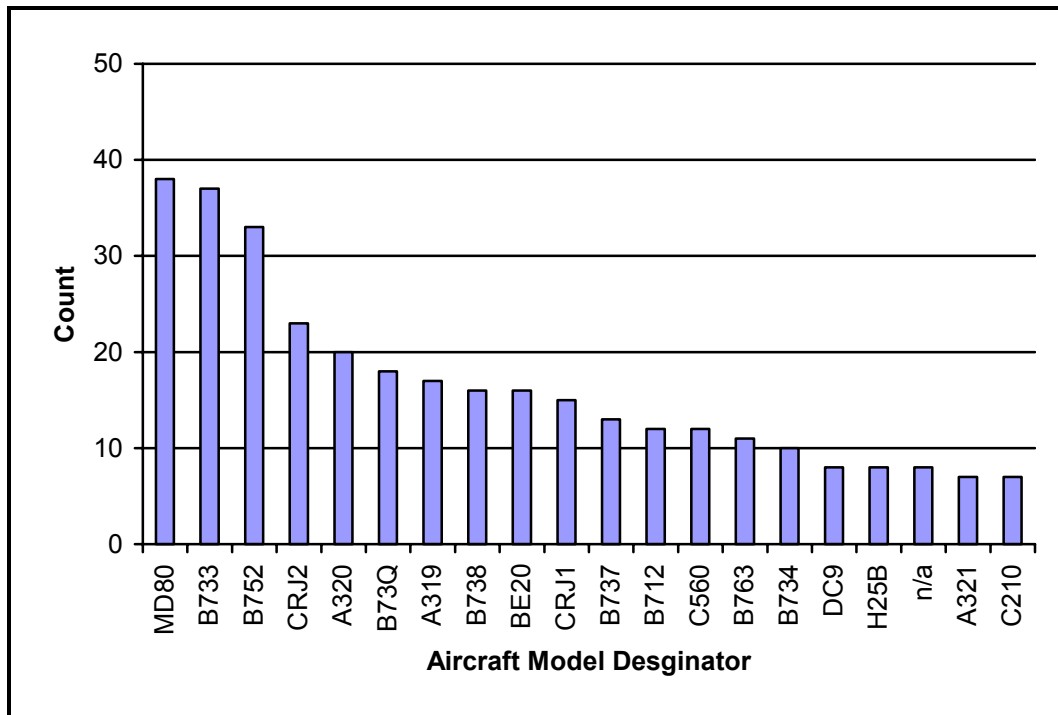


Figure 2: Count of Top Twenty Aircraft Models

4.3 Navigational Equipage

This section corresponds to Section 3.4.3 of Reference[1].

Table 8: Count by Aircraft Navigational Equipage Type

Nav. Equip. Designator	Count	Percentage of total
G	132	23.322
E	104	18.375
F	88	15.548
I	67	11.837
A	66	11.661
R	60	10.601
W	18	3.180
Q	15	2.650
Unknown	14	2.473
P	2	0.353
Total	566	100.000

4.4 Carrier Distribution

This section corresponds to Section 3.4.4 of Reference[1].

Table 9: Count by Carrier Type

Category	Count	Percentage of Total
Commercial	375	66.254
General Aviation	146	25.795
Other ⁵	45	7.951
Total	566	100.000

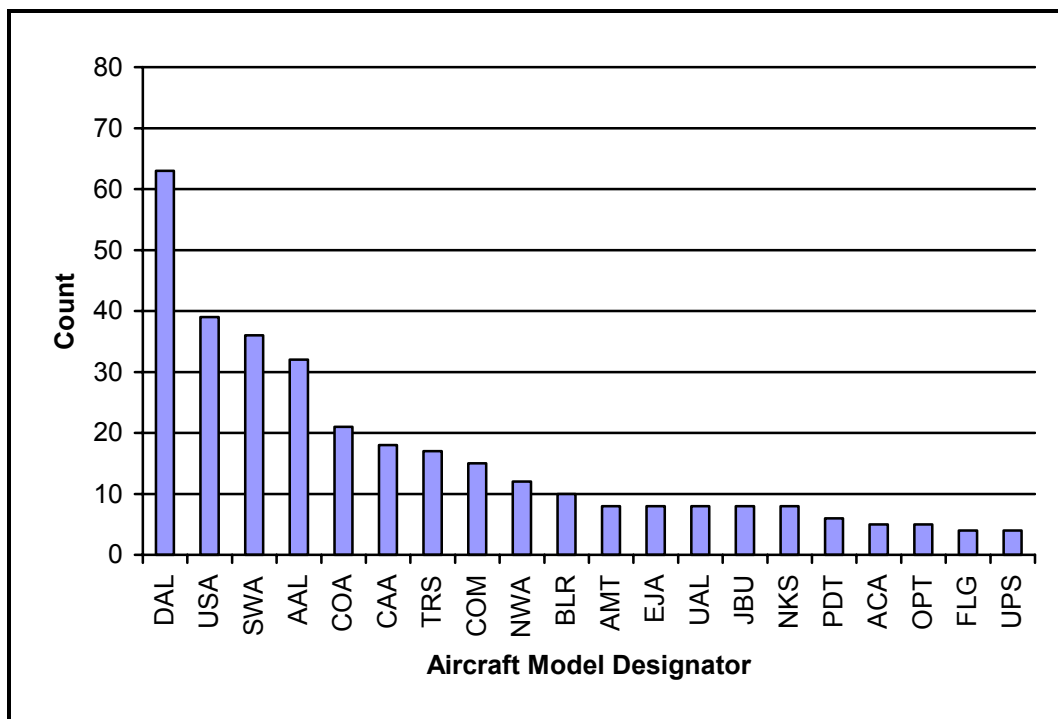


Figure 3: Count by Top Twenty Air Carriers

⁵ Includes military and aircraft with unrecognized designators

5 Reference

- [1] Paglione, M., Oaks, R., Ryan, Dr. H., Summerill, J.S., (Final, January 2000), "Description of Accuracy Scenarios for the Acceptance Testing of the User Request Evaluation Tool (URET) / Core Capability Limited Deployment (CCLD)," FAA William J. Hughes Technical Center / ACT-250, Atlantic City, New Jersey.
- [2] Paglione, Mike M., Oaks, Robert D., Summerill, J. Scott, "Time Shifting Air Traffic Data for Quantitative Evaluation of a Conflict Probe," Submitted to the *American Institute of Aeronautics and Astronautics (AIAA) Guidance, Navigation, and Control Conference*, Austin TX, August 2003.
- [3] Paglione, Mike M., Oaks, Robert D., Bilimoria, Karl D., "Methodology for Generating Conflict Scenarios by Time Shifting Recorded Traffic Data," Submitted to 5th *USA/EUOPR Air Traffic Management R&D Seminar*, Budapest, Hungary, June 2003.